YCSD Algebra II Scope and Sequence 9-30-2018

The goal of the scope and sequence below is to build a map for math instruction that adheres to the standards and follows a basic pattern. The corresponding pacing guide outlines the use of these standards within an appropriate time frame for teaching each unit and lesson(s).

Quarter	1st		2nd		3rd		4th	
Units	1	2	3	4	5	6	7	8
Number and Quantity The complex number system	N.CN.1 N.CN.2 N.CN.8	N.CN.7 N.CN.9						
Algebra Seeing Structure in Expressions	A.SSE.1A A.SSE.2	A.SSE.1B		A.SSE.2 A.SSE.3				
Algebra Arithmetic with Polynomials and Rational Expressions	A.APR.1	A.APR3				A.APR.7		
Algebra Creating Equations	A.CED.2	A.CED.1 A.CED.3		A.CED.1	A.CED.2	A,CED.1 A.CED.2		
Algebra Reasoning with Equations and Inequalities			A.REI.2			A.REI.2		
Functions Interpreting Functions	F.IF.4 F.IF.5 F.IF.7B F.IF.7C F.IF.8A F.IF.9	F.IF.8A	F.IF.4 F.IF.7B	F.IF.4 F.IF.7E F.IF.8B	F.IF.7E	F.IF.4		
Functions Building Functions	F.BF.3		F.BF.1B F.BF.1C F.BF.3 F.BF.4A			F.BF.3		
Functions				F.LE.4				

Linear Quadratic, and Exponential Models								
Functions Trigonometric Functions					F.TF.1 F.TF.2 F.TF.5			F.TF.8
Geometry Similarity, Right Triangles, and Trigonometry					G.SRT.8			
Probability Interpreting Categorical and quantitative Data							S.ID.4	
Probability Making Inferences and Justifying Conclusions							S.IC.1 S.IC.2 S.IC.3 S.IC.4 S.IC.5	
Probability Using Probability to make decisions							S.MD.6 S.MD.7	
Standards of Mathematical Practice	MP 1 MP 2 MP 3 MP 4 MP 5 MP 6 MP 7 MP 8	MP 1 MP 2 MP 3 MP 4 MP 5 MP 6 MP 7 MP 8	MP 1 MP 2 MP 3 MP 4 MP 5 MP 6 MP 7 MP 8	MP 1 MP 2 MP 3 MP 4 MP 5 MP 6 MP 7 MP 8	MP 1 MP 2 MP 3 MP 4 MP 5 MP 6 MP 7 MP 8	MP 1 MP 2 MP 3 MP 4 MP 5 MP 6 MP 7 MP 8	MP 1 MP 2 MP 3 MP 4 MP 5 MP 6 MP 7 MP 8	MP 1 MP 2 MP 3 MP 4 MP 5 MP 6 MP 7 MP 8

Course: Algebra / Functions	Quarter: 1st
Unit 1	

Number and Quantity- The complex number system

N.CN.1 Know there is a complex number *ii* such that *ii*2 = −1, and every complex number has the form *aa* + *bbbb* with *aa* and *bb* real.
N.CN.2 Use the relation *ii* 2= −1 and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers
N.CN.8 Extend polynomial identities to the complex numbers. For example, rewrite $x^2 + 4$ as (x + 2 *ii*)(x − 2 *ii*).

Algebra - Seeing Structure in Expressions

A.SSE.1. Interpret expressions that represent a quantity in terms of its context. ★ a. Interpret parts of an expression, such as terms, factors, and coefficients.
A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, to factor $3x(x - 5) + 2(x - 5)$, students should recognize that the "$x - 5$" is common to both expressions being added, so it simplifies to $(3x + 2)(x - 5)$; or see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

Algebra - Arithmetic with Polynomials and Rational Expressions

Algebra - Creating Equations

A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.★
a. Focus on applying linear and simple exponential expressions. (A1, M1) b. Focus on applying simple quadratic expressions. (A1, M2) c. Extend to include more complicated function situations with the option to graph with technology. (A2, M3)

Algebra - Reasoning with Equations and Inequalities

Functions - Interpreting Functions

F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include the following: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★(A2, M3)
a. Focus on linear and exponential functions. (M1)
b. Focus on linear, quadratic, and exponential functions. (A1, M2)
F.IF.5 Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the positive integers would be an appropriate domain for the function.★
F.IF.7 Graph functions expressed symbolically and indicate key features of the graph, by hand in simple cases and using technology for more complicated cases. Include applications and how key features relate to characteristics of a situation, making selection of a particular type of function model appropriate.
b. Graph quadratic functions and indicate intercepts, maxima, and minima. (A1, M2)
c. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. (A2, M3)
F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.
a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. (A2, M3) i. Focus on completing the square to quadratic functions with the leading coefficient of 1.
F.IF.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum. (A2, M3)
a. Focus on linear and exponential functions. (M1)
b. Focus on linear, quadratic, and exponential functions. (A1, M2)

Functions - Building Functions

F.BF.3 Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. (A2, M3)

a. Focus on transformations of graphs of quadratic functions, except for f(kx); (A1, M2)

Functions – Linear, Quadratic, and Exponential Models

Functions – Trigonometric Functions

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Course: Algebra / Functions	Quarter: 1st

Unit 2

Number and Quantity- The complex number system

N.CN.7 Solve quadratic equations with real coefficients that have complex solutions
N.CN.9 Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Algebra - Seeing Structure in Expressions

A.SSE.1 Interpret expressions that represent a quantity in terms of its context.

b. Interpret complicated expressions by viewing one or more of their parts as a single entity.

Algebra - Arithmetic with Polynomials and Rational Expressions

A.APR.3 Identify zeros of polynomials, when factoring is reasonable, and use the zeros to construct a rough graph of the function defined by the polynomial.

Algebra - Creating Equations

A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations and inequalities arising from linear, quadratic, simple rational, and exponential functions. ★

a. Focus on applying linear and simple exponential expressions. (A1, M1)

b. Focus on applying simple quadratic expressions. (A1, M2) c. Extend to include more complicated function situations with the option to solve with technology. (A2, M3**)**

A.CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.★ (A1, M1)

a. While functions will often be linear, exponential, or quadratic, the types of problems should draw from more complicated situations. (A2, M3)

Algebra - Reasoning with Equations and Inequalities

Functions - Interpreting Functions

F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. (A2, M3)

i. Focus on completing the square to quadratic functions with the leading coefficient of 1. (A1, M2)

Functions - Building Functions

Functions – Linear, Quadratic, and Exponential Models

Functions – Trigonometric Functions

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Course: Algebra / Functions	Quarter: 2nd
Unit 3	
Algebra - Seeing Structure in Expressions	
Algebra - Arithmetic with Polynomials and Rational Expressions	
Algebra - Creating Equations	
Algebra - Reasoning with Equations and Inequalities **A.REI.2** Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.	
Functions - Interpreting Functions **F.IF.4** For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include the following: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★(A2, M3) **a**. Focus on linear and exponential functions. (M1) **b**. Focus on linear, quadratic, and exponential functions. (A1, M2) **F.IF.7** Graph functions expressed symbolically and indicate key features of the graph, by hand in simple cases and using technology for more complicated cases. Include applications and how key features relate to characteristics of a situation, making selection of a particular type of function model appropriate.★ **a**. Graph linear functions and indicate intercepts. (A1, M1) **b**. Graph quadratic functions and indicate intercepts, maxima, and minima. (A1, M2)	
Functions - Building Functions **F.BF.1** Write a function that describes a relationship between two quantities.★ **b**. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a	

constant function to a decaying exponential, and relate these functions to the model. (A2, M3) (+)

c. Compose functions. For example, if T(y) is the temperature in the atmosphere as a function of height, and h(t) is the height of a weather balloon as a function of time, then T(h(t)) is the temperature at the location of the weather balloon as a function of time.

F.BF.3 Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. (A2, M3) a. Focus on transformations of graphs of quadratic functions, except for f(kx); (A1, M2)

F.BF.4 Find inverse functions.

a. Informally determine the input of a function when the output is known. (A1, M1)

Functions – Linear, Quadratic, and Exponential Models

Functions – Trigonometric Functions

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Course: Algebra / Functions	Quarter: 2nd

Unit 4

Algebra - Seeing Structure in Expressions

A.SSE.2 Use the structure of an expression to identify ways to rewrite it. For example, to factor $3x(x - 5) + 2(x - 5)$, students should recognize that the "$x - 5$" is common to both expressions being added, so it simplifies to $(3x + 2)(x - 5)$; or see $x^4 - y^4$ as $(x^2)^2 - (y^2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 - y^2)(x^2 + y^2)$.

A.SSE.3 Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.*

c. Use the properties of exponents to transform expressions for exponential functions. For example, 8^t can be written as 2^{3t}.

Algebra - Arithmetic with Polynomials and Rational Expressions

Algebra - Creating Equations

A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations and inequalities arising from linear, quadratic, simple rational, and exponential functions. ★

a. Focus on applying linear and simple exponential expressions. (A1, M1)

b. Focus on applying simple quadratic expressions. (A1, M2)

c. Extend to include more complicated function situations with the option to solve with technology. (A2, M3)

Algebra - Reasoning with Equations and Inequalities

Functions - Interpreting Functions

F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include the following: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★(A2, M3)

a. Focus on linear and exponential functions. (M1)

b. Focus on linear, quadratic, and exponential functions. (A1, M2)

F.IF.7 Graph functions expressed symbolically and indicate key features of the graph, by hand in simple cases and using technology for more complicated cases. Include applications and how key features relate to characteristics of a situation, making selection of a particular type of function model appropriate.★

e. Graph simple exponential functions, indicating intercepts and end behavior. (A1, M1)

F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

b. Use the properties of exponents to interpret expressions for exponential functions.

Functions - Building Functions

Functions – Linear, Quadratic, and Exponential Models

F.LE.4 For exponential models, express as a logarithm the solution to abct = d where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.★

Functions – Trigonometric Functions

Standards of Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Course: Algebra / Functions	Quarter: 3rd

Unit 5

Algebra - Seeing Structure in Expressions

Algebra - Arithmetic with Polynomials and Rational Expressions

Algebra - Creating Equations

A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.★

a. Focus on applying linear and simple exponential expressions. (A1, M1)

b. Focus on applying simple quadratic expressions. (A1, M2)

c. Extend to include more complicated function situations with the option to graph with technology. (A2, M3)

Algebra - Reasoning with Equations and Inequalities

Functions - Interpreting Functions

F.IF.7 Graph functions expressed symbolically and indicate key features of the graph, by hand in simple cases and using technology for more complicated cases. Include applications and how key features relate to characteristics of a situation, making selection of a particular type of function model appropriate.★

e. Graph simple exponential functions, indicating intercepts and end behavior. (A1, M1)

Functions - Building Functions

Functions – Linear, Quadratic, and Exponential Models

Functions – Trigonometric Functions

F.TF.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
F.TF.2 Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.
F.TF.5 Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★

Geometry – Similarity , Right Triangles , and Trigonometry

G.SRT.8 Solve problems involving right triangles.★

a. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems if one of the two acute angles and a side length is given. (G, M2)

b. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.★ (A2, M3)

Standards of Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Course: Algebra / Functions	Quarter: 3rd

Unit 6

Algebra - Seeing Structure in Expressions

Algebra - Arithmetic with Polynomials and Rational Expressions

A.APR.7 Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.

Algebra - Creating Equations

A.CED.1 Create equations and inequalities in one variable and use them to solve problems. Include equations and inequalities arising from linear, quadratic,

simple rational, and exponential functions. ★

a. Focus on applying linear and simple exponential expressions. (A1, M1)
b. Focus on applying simple quadratic expressions. (A1, M2)
c. Extend to include more complicated function situations with the option to solve with technology. (A2, M3)

A.CED.2 Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.★

a. Focus on applying linear and simple exponential expressions. (A1, M1)
b. Focus on applying simple quadratic expressions. (A1, M2)
c. Extend to include more complicated function situations with the option to graph with technology. (A2, M3)

Algebra - Reasoning with Equations and Inequalities

A.REI.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Functions - Interpreting Functions

F.IF.4 For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include the following: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity.★(A2, M3)

a. Focus on linear and exponential functions. (M1)
b. Focus on linear, quadratic, and exponential functions. (A1, M2)

Functions - Building Functions

F.BF.3 Identify the effect on the graph of replacing f(x) by f(x) + k, kf(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them. (A2, M3)

a. Focus on transformations of graphs of quadratic functions, except for f(kx); (A1, M2)

Functions – Linear, Quadratic, and Exponential Models

Functions – Trigonometric Functions

Geometry – Similarity , Right Triangles , and Trigonometry

Standards of Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Course: Algebra / Functions	Quarter: 4th
Unit 7	
Algebra - Seeing Structure in Expressions	
Algebra - Arithmetic with Polynomials and Rational Expressions	
Algebra - Creating Equations	
Algebra - Reasoning with Equations and Inequalities	
Functions - Interpreting Functions	
Functions - Building Functions	
Functions – Linear, Quadratic, and Exponential Models	
Functions – Trigonometric Functions	
Statistics and Probability - Interpreting Categorical and quantitative Data **S.ID.4** Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and tables to estimate areas under the normal curve.★	
Statistics and Probability - Making Inferences and Justifying Conclusion **S.IC.1** Understand statistics as a process for making inferences about population parameters based on a random sample from that population.★ **S.IC.2** Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model?★ **S.IC.3** Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.★ **S.IC.4** Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.★	

S.IC.5 Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between sample statistics are statistically significant.★
S.ID.6 Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.★

a. Fit a function to the data; use functions fitted to data to solve problems in the context of the data. Use given functions, or choose a function suggested by the context. Emphasize linear, quadratic, and exponential models. (A2, M3)

b. Informally assess the fit of a function by discussing residuals. (A2, M3)

c. Fit a linear function for a scatterplot that suggests a linear association. (A1, M1)

Statistics and Probability- Using Probability to make decisions

(+) **S.MD.6** Use probabilities to make fair decisions, e.g., drawing by lots, using a random number generator.★
(+) **S.MD.7** Analyze decisions and strategies using probability concepts, e.g., product testing, medical testing, pulling a hockey goalie at the end of a game.★

Standards of Mathematical Practice

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

Course: Algebra / Functions	Quarter: 4th
Unit 8	
Algebra - Seeing Structure in Expressions	
Algebra - Arithmetic with Polynomials and Rational Expressions	

Algebra - Creating Equations
Algebra - Reasoning with Equations and Inequalities
Functions - Interpreting Functions
Functions - Building Functions
Functions – Linear, Quadratic, and Exponential Models
Functions – Trigonometric Functions **F.TF.8** Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$, and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.
Standards of Mathematical Practice 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.